Draft
Screening Site Inspection Work Plan

for

Mobile Waste Controls
TXD 988051652

Houston, Texas

Prepared in cooperation with

Texas Water Commission
and
U.S. Environmental Protection Agency

September 1992

ENGINEERING-SCIENCE

DRAFT
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Prepared by

Engineering-Science, Inc.
Austin, Texas

September 1992

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SCREENING SITE INSPECTION WORK PLAN

MOBILE WASTE CONTROLS

HOUSTON, TEXAS

TXD 988051652

SIGNATURE PAGE

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SECTION 1

INTRODUCTION

Engineering-Science, Inc. (ES) has been contracted by the Texas Water Commission (TWC) to conduct a screening site inspection (SSI) at the Mobile Waste Controls site (EPA identification number TXD 988051652). This site is located on approximately 25 acres at 10000 Minnesota Street in Houston, Harris County, Texas.[ref. 1] This work plan was prepared to describe the site reconnaissance and sampling activities which are recommended to be performed at the site.

WORK PLAN OVERVIEW

This SSI work plan was developed using the best available information obtained primarily through a review of the preliminary assessment report (PA) and a review of the analytical results of groundwater, surface water and sediment sampling performed by the City of Houston, the TWC District 7 office, and the Federal Deposit Insurance Corporation (FDIC). Some of the information included may be incomplete. Therefore, much of the planned activities described should be considered tentative. This plan will be modified as necessary based on the actual site conditions encountered.

Section 1 is this introduction. Section 2 is the site background and description, and Section 3 describes the site field work to be conducted. The PA, the health and safety plan, the quality assurance project plan, and the site reconnaissance checklist are presented as appendices A through D, respectively.

SITE OBJECTIVES WITH RESPECT TO THE PREREDIAL PROCESS

The preredial stage of the Superfund process involves an ~~expanded~~ PA and a site inspection (SI) stage consisting of an SSI and, if necessary, a listing site inspection (LSI). The activities described in this work plan are designed to fulfill the requirements for a focused SSI.

A PA has already been conducted on the site addressed in this work plan. In addition, groundwater, sediment and surface water sampling have been performed. The SSI will build upon data collected during the PA by collecting additional data through background information research and the collection of environmental samples to further characterize conditions at the site. Sampling conducted during the SSI will attempt to identify the types of contaminants present, if any, to assess

whether a release of hazardous substances has occurred, look for evidence of actual human and environmental exposure to contaminants, and determine whether a site will move forward to an LSI or be designated as "no further remedial action planned."

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SECTION 2

SITE BACKGROUND AND DESCRIPTION

SITE INFORMATION

The inactive Mobile Waste Controls site is located at 10000 Minnesota Street in Houston, Harris County, Texas, half a mile west of the intersection of Almeda-Genoa Road and IH 45.[ref. 1] The geographic coordinates of the site are approximately 29° 37' 19" north and 95° 13' 59" west.[ref. 1] As depicted in Figure 1, the site (Area A) is a maintained grass field transected by Windmill Lakes Boulevard with a fenced boat storage area along the western edge of the site.[ref. 2] The site is bordered on the north and south by apartment complexes (Windmill Landing Apartments), to the west by Lake Westwind which serves as a local recreational area, and to the east by a vacant lot and a horse stable.[ref. 1]

Based on a Harris County tax records search, the FDIC owns approximately 121.9-acres surrounding and including the site.[ref. 3] The property is managed by Ameresco Management, Inc.[ref. 3] During the late 1960s, the area was an active sand quarry.[ref. 1] Five deep pits were excavated at the site; two large (1,000-foot diameter) and three small (300-foot diameter). Precipitation, surface water run off, and groundwater accumulation caused the two large and two of the small pits to become four small lakes.[ref. 1] The fifth pit was used for disposal of wastes.

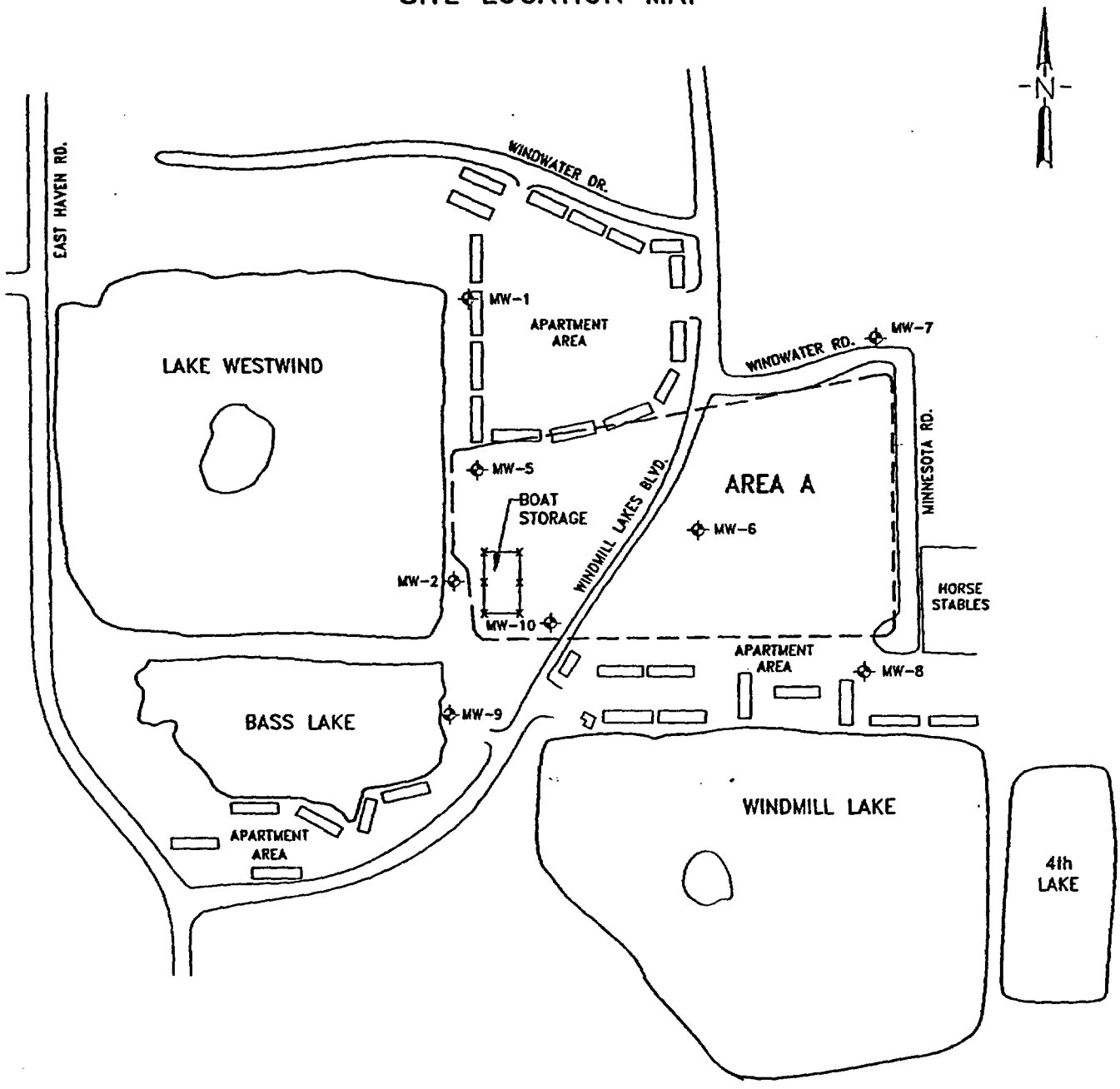
From 1969 through 1981, the property was owned by Realty Reclamation, Inc. and operated as an industrial and commercial landfill by Wallace Waste Control Company, Metropolitan Waste Conversion, National Disposal Contractors, and Mobile Waste Controls, Inc.[ref. 1] In 1982, Levering & Reid created Windmill Lakes Subdivision and constructed three apartment complexes bordering the lakes. The PA, conducted on December 19, 1991, specified air, groundwater, surface water and soil exposure pathways of concern.[ref. 1]

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

Characteristics

By 1972, one of the small, unlined pits (Figure 1, Area A) had been two-thirds filled with industrial and commercial wastes.[ref. 1] City of Houston representatives documented receipt of industrial chemicals, municipal and putrescible wastes; several fires; and odor problems.[ref. 1] An unknown quantity of industrial chemicals were disposed in this pit for at least 5 years, ending in 1974.[ref. 1] In addition, wood,

FIGURE 1
MOBILE WASTE CONTROLS
SITE LOCATION MAP



EXPLANATION

— — APPROXIMATE BOUNDARY OF CLOSED LANDFILL BASED ON AIR PHOTO (DEC. 1973).

MONITOR WELL

FENCE LINE

0 500

APPROXIMATE SCALE IN FEET

MWCMAP2
AU332.12

paper, plastics, rubber, metal, neoprene, Styrofoam, urethane, PVC pellets, plastic resins, asbestos, oil-contaminated filter cake, asphalt, and municipal garbage have been disposed at the site.(ref. 1) The total volume and precise composition of the waste disposed at the site is not known.

The in place thickness of the disposed materials varies from 1 to 16 feet, with the deepest portion of the excavation near the southwest corner.(ref. 1) The thickness of the final cover varies from less than 6 inches over large, central portions of the area to over 6 feet in areas along the north side of the closed landfill.(ref. 1,) During the construction of the Windmill Lakes Subdivision, Windmill Lakes Boulevard was constructed over the landfill site (Figure 2, Area A).(ref. 1) The landfill cap was disturbed by surveying and construction, resulting in exposed waste material which was subsequently covered.(ref. 1)

The only known source is the landfill cell disposed waste. Potential means of migration include the leachate produced within the closed landfill (disposal pit), light hydrocarbon gases (methane) produced by organic waste decomposition, and volatile constituents migrating through the vadose soil zone and into the atmosphere.(ref. 1) Numerous investigations have shown that in nonarid regions, infiltration of water through refuse causes water table mounding within or below the landfill.(ref. 6) Water table mounding causes leachate to flow downward and outward from the landfill. Downward flow of leachate may threaten groundwater resources. Outward flow normally causes leachate springs at the periphery of the landfill or into surface water bodies.(ref. 6)

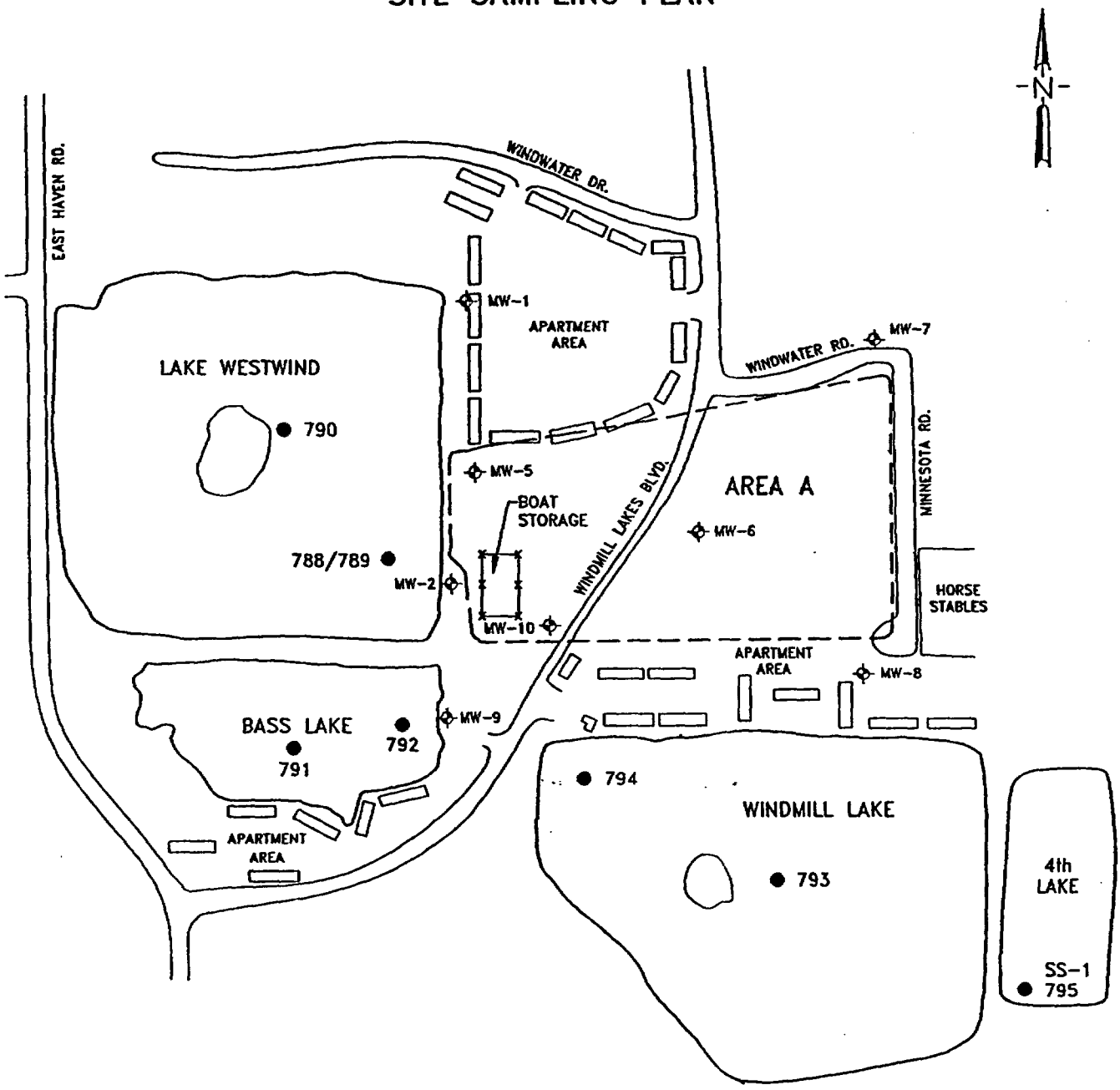
Resource Engineering, Inc. (REI), (hired by Levering & Reid), and the City of Houston Public Health Department conducted joint groundwater sampling at the site during 1982 and 1983.(ref. 1) Groundwater sample results indicated elevated concentrations of total suspended solids (TSS), and total organic carbon (TOC), high chemical oxygen demand (COD), and the presence of benzene, toluene, and several complex organic compounds in the monitoring wells sampled.(ref. 1) In 1983 detectable levels of extractable priority pollutants were present in the leachate samples collected from the landfill; however, the leachate was not determined to be hazardous according to Resource Conservation and Recovery Act (RCRA) standards.(ref. 1) Ten aliphatic hydrocarbons (oil constituents and/or stable organic decomposition products); 14 fatty acids; and 11 RCRA-listed organic compounds (toluene, xylene, aniline, naphthalene, 1,4-dichlorobenzene, 1,1'-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2,3-dimethyl phenol, and diethyl phthalate) were also detected in the leachate.(ref. 1)

Six leachate samples were obtained from monitoring well 6, near the center of the landfill, from September through December 1982.(ref. 1, Atch. 7, p. 27) The maximum concentrations representing measured leachate characteristics were:

TDS	14,177 mg/L
Sulfate (SO_4)	790 mg/L
Manganese (Mn)	8.80 mg/L
Iron (Fe)	313 mg/L

How do you collect leachate sample from a MW?

FIGURE 2
MOBILE WASTE CONTROLS
SITE SAMPLING PLAN



EXPLANATION

- — — APPROXIMATE BOUNDARY OF CLOSED LANDFILL BASED ON AIR PHOTO (DEC. 1973).
- MONITOR WELL
- FENCE LINE
- CO-SAMPLING LOCATIONS 2/20/92 CITY OF HOUSTON DESIGNATIONS

0 500

APPROXIMATE SCALE IN FEET

MWCMAP2
AU332.12

Sodium (Na)	2,772 mg/L
Chloride (Cl)	4,140 mg/L
TOC	3,976 mg/L

The City of Houston, the TWC District 7 office, and the FDIC, through Ameresco Management, participated in a joint groundwater, surface water, and lake sediment sampling program during December 1991 and February 1992.(ref. 2) Existing monitoring wells were sampled on December 11, 1991. Sediment, soil, and lake samples were collected on February 20, 1992. The sample locations are indicated on Figure 2.(ref. 3) The results of the analytical program are summarized in Tables 1 through 9. The parameters listed include metal and water quality data, and detected organic compounds.

Acetone was detected during the QA/QC analysis for the December 11, 1991, sampling program. This indicates that the presence of acetone in the sample could have resulted from acetone contamination of laboratory instruments and/or the laboratory sample containers.(ref. 5) Sample data will be required to confirm that the presence of acetone is a laboratory artifact.

As previously mentioned, a potential problem is light hydrocarbon (methane) gas emissions generated from organic wastes deposited in the landfill. The thin cover over large portions of the fill, coupled with poor compaction of the waste materials within, will tend to promote gas migration through the surface of the landfill and into the atmosphere.(ref. 1, Atch. 7, p. 18-19) Since methane is flammable at concentrations of 5 to 15 percent (volume) in air, escape of gas from the landfill could present a potential fire risk.(ref. 1)

Based on this characterization of the site, the primary contaminants of concern are benzene, toluene, ethylbenzene, 2-nitropropane, chlorobenzene, cyclohexane, xylene, aniline, napthalene, 1,4-dichlorobenzene, 1,1'-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2,3 dimethyl phenol, diethyl phthalate, and styrene.(ref. 1) Additionally, accumulation of methane in adjacent structures presents a health and safety concern.

Required Information (Data Gaps)

- Verification of site features as depicted on the site location map. In particular, the location of the monitoring wells will be verified.
- Verification of sampling performed at the site, including the location of the lake and sediment samples obtained during the sampling program performed by the TWC, the City of Houston, and the FDIC.
- Verification of existing analytical data results required through additional testing and additional review of laboratory QA/QC data.
- Field verification of landfill cover thickness required to determine containment of the potential source for the soil exposure pathway or release to the air pathway.

Table 1 Mobile Waste Controls Results of TWC Monitoring Well Sampling Program
December 11, 1991

Well ID	COD (mg/L)	TOC (mg/L)	Cl^- (mg/L)	TSS (mg/L)	VSS (mg/L)	TDS (mg/L)	Cyanides (mg/L)	Phenols (mg/L)	NO_2-N (mg/L)	NO_3-N (mg/L)
MW-1	<5	5	132	244	14	814	-	-	-	-
MW-2	Sample data not taken at this time.									
MW-5	350	129	782	134	25	2,160	<0.02	23	<0.01	<0.01
MW-6	134	6	58	<5	26	831	<0.02	<5	<0.01	<0.01
MW-8	60	25	NA*	23	5	1,270				
MW-9	157	57	553	75	15	1,760	<0.02	15	<0.01	<0.01
MW-10	531	192	73	194	62	2,400	<0.02	40	<0.01	<0.01

* Copy of analytical data sheet indecipherable.

NA Not available.

Table 2
Mobile Waste Controls
Monitoring Well Sampling Results
December 11,1991

December 11,1991	Ag	As	Ba	Cd	Cr	Cu	Hg	Mn	Ni	Pb	Se	Zn	Al	Co	V	Chloride	COD	Cyanide	pH	Phenol	Sulfide	TDS	TOC	VSS	TSS
	ug/L															mg/L		ug/L		ug/L	mg/L				
MW-1	<0.2	<4.0	290	3.6	<5.0	8.6	0.96	77.0	<22.0	5.20	<4.0	44.0	660	<9.0	<8.0	118	60	<10	6.84	<10	<0.16	770	2.2	93	253
MW-2	<0.2	2100	500	1.0	<5.0	<8.0	<0.2	4000	30.0	<0.2	<4.0	14.0	190	<9.0	<8.0	470	180	<10	6.80	211	1.12	1800	49	40	120
MW-5	<0.2	66	1100	0.9	<5.0	<8.0	<0.2	2800	<22.0	<0.2	<4.0	38.0	310	<9.0	11.0	667	320	<10	6.62	310	1.44	2360	105	60	160
MW-6	<0.2	63	840	13.0	26.0	<8.0	<0.2	2400	<22.0	230	<4.0	180,000	690	16.0	57.0	51	80	<10	6.93	21	0.46	790	19	400	1700
MW-7	Not Sampled at this Time																								
MW-8	<0.2	9.7	610	3.0	<5.0	<8.0	<0.2	1500	<22.0	2.8	<4.0	41.0	220	<9.0	<8.0	220	70	<10	6.84	<10	<0.16	1270	19	<10	30
MW-9	<0.2	5.2	240	1.6	<5.0	<8.0	<0.2	570	<22.0	5.5	<4.0	31.0	2600	<9.0	9.4	90	40	<10	7.44	<10	<0.16	500	1.6	<10	260
MW-9D	<0.2	4.4	220	0.9	<5.0	<8.0	<0.2	540	<22.0	2.6	<4.0	23.0	2600	<9.0	9.6	66	40	<10	7.47	<10	<0.16	530	1.3	100	900
MW-10	<0.2	16.0	560	3.8	10.0	91.0	4.0	990	<22.0	7.2	<4.0	110.0	1200	<9.0	10.0	852	560	<10	6.67	404	4.96	2310	211	60	160

Table 3
Mobile Waste Controls
Concentrations of Volatile, Semi-Volatile and Organic Compounds in Water
December 11,1991

	Volatiles								Semi-Volatiles					
December 11,1991	acetone	1,1,2,2 tetrachloroethane	chloroform	benzene	toluene	chlorobenzene	ethylbenzene	xylenes (total)	naphthalene	4-chloroaniline	bis (2-ethyhexyl) phthalat	benzoic acid	2-methinaphthalene	N-Nitrosodiphenylamin
	ug/L								ug/L					
MW-1	14	3*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	11	ND	ND	7	ND	19	ND	ND	2*	140	6*	ND	ND	ND
MW-5	29	ND	6	11	9	16	32	16	17	83	4*	ND	ND	ND
MW-5D	NA	NA	NA	12	9	16	34	18	ND	ND	ND	ND	ND	ND
MW-6	20	ND	ND	ND	ND	6	ND	ND	ND	ND	10*	19*	ND	ND
MW-7	Not Sampled at this Time													
MW-8	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3*	ND	ND	ND
MW-9D	6*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-10	11	ND	ND	14	ND	26	95	26	13*	550**	13*	ND	9*	22

NA - Not Available
ND - Not Detected
* - Below listed detection limit
** - Compound amount taken from a 1:10 dilution

	Organics				
December 11,1991	2,4,5 TP (Silvex)	Dalapon	Dicamba	Dichloroprop	Dinoseb
	ug/L				
MW-10	0.16*	16	1.4	3.3	1.4

* - Below method detection limit

TWCa.WK3

Table 4 Mobile Waste Controls Results of TWC Sampling Program
February 20, 1992

Sample ID	City of Houston Sample ID	Location	Results COD (mg/L)	TOC (mg/L)	Cl^- (mg/L)
Westwind Lake					
WEST #1	790	Mid-lake; east side of island	<5	7	21
WEST #2	788/789	East bank near MW-2	<5	5	21
Bass Lake					
BASS #1	792	East corner along bank near MW-9	<5	3	19
BASS #2	791	Mid lake; north side island	<5	3	19
Windmill Lake					
WIND #1	794	North of pier	<5	5	13
WIND #2	793	North side of island; mid-lake	<5	4	13
4th Lake	795	South bank of 4th lake	16	7	14

Table 5 Mobile Waste Controls Results of City of Houston Lake and Sediment Sampling February 20, 1992

Sample ID	Sample Matrix	Volatile Priority Pollutants Detection Limit 10 ppb	Semi-volatile Priority Pollutants Detection Limit 10 ppb	Fecal Coliform
788	Water	ND	ND	<200
789	Water	ND	ND*	400
790	Water	ND	ND	<200
791	Water	ND	ND	NA
792	Water	ND	ND	NA
793	Water	ND	ND	NA
794	Water	ND	ND	NA
795	Water	ND	ND	NA

ND Not detected.

NA Not available.

* Detection limit 20 ppb.

Table 6 Mobile Waste Controls
Results of City of Houston Lake Sampling
February 20, 1992

Sample ID	Ag (mg/L)	As (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Hg (mg/L)	Mn (mg/L)	Ni (mg/L)	Pb (mg/L)	Zn (mg/L)	Se (mg/L)
788	<0.01	<0.001	<0.1	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
790	<0.01	<0.001	<0.1	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
791	<0.01	0.003	<0.1	<0.01	<0.01	0.05	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
792	<0.01	<0.001	<0.1	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
793	<0.01	<0.001	0.27	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
794	<0.01	<0.001	0.54	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002
795	<0.01	<0.001	<0.1	<0.01	<0.01	<0.01	<0.001	<0.01	<0.03	<0.04	<0.01	<0.002

Table 7
Mobile Waste Controls
Concentrations of Metals in Water Matrix
February 20, 1992

February 20, 1992	Ag	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn	Fecal Coliform
	ug/L																							Colonies/100 ml
Bass-2	<2.0	270	<2.0	62	<1.0	13,719	<3.0	<4.0	<3.0	5.3	149	<0.2	2,128	2,781	5.7	49,365	<22.0	<1.0	<30.0	<2.0	3.2	44.0	10.0	401
Wind-1	<2.0	84.0	<2.0	67.0	<1.0	16,146	<3.0	<4.0	<3.0	<3.0	99.0	<0.2	2,314	4,295	6.6	22,650	<22.0	<1.0	<30.0	<2.0	<2.0	<4.0	16.0	<1
West-1	<2.0	62.0	<2.0	65.0	<1.0	18,090	<3.0	<4.0	<3.0	3.3	95.0	<0.2	2,903	6,526	6.2	23,690	<22.0	<1.0	<30.0	<2.0	<2.0	<4.0	13.0	<1
West-2	<2.0	112	3.0	91.0	<1.0	29,693	<3.0	<4.0	<3.0	3.9	116	<0.2	3,037	6,622	7.0	25,071	<22.0	<1.0	<30.0	<2.0	<2.0	<4.0	17.0	27
Bass-1	<2.0	302	3.0	65.0	<1.0	13,624	<3.0	<4.0	<3.0	6.3	166	<0.2	1,611	2,869	5.3	51,669	<22.0	<1.0	<30.0	<2.0	<2.0	<4.0	19.0	<1
Wind-2	<2.0	65.0	5.4	71.0	<1.0	18,386	<3.0	<4.0	<3.0	<3.0	82.0	<0.2	1,818	4,276	4.4	22,687	<22.0	<1.0	<30.0	<2.0	<2.0	<4.0	19.0	<1
4th Lake	<2.0	178	5.0	106	<1.0	33,667	<3.0	<4.0	<3.0	5.6	531	<0.2	2,531	8,002	224	26,985	<22.0	5.7	<30.0	3.0	<2.0	44.0	47.0	<1

Concentrations of Metals in Sediment and Soil Matrix

February 20, 1992	Ag	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn	Matrix
	mg/Kg																							
Bass-2	<1.9	19,576	13.0	149	<0.93	3,902	<280	7.1	17.0	58.0	15,447	<0.47	1,842	2,483	90.0	691	<20.0	26.0	<28.0	<1.9	7.2	32.0	59.0	Sediment
Wind-1	<0.62	1,589	3.3	19.0	<0.31	632	0.93	1.9	2.3	4.3	2,034	<0.16	173	257	12.0	48.0	<6.5	4.3	<4.5	<0.62	0.62	5.8	13.0	Sediment
West-1	<0.78	6,573	9.7	72.0	<0.39	9,753	<1.2	4.3	9.3	19.0	9,218	<0.19	1,265	1,652	237	139	8.9	16.0	<12.0	<0.77	<0.77	18.0	53.0	Sediment
West-2	<1.3	26,629	17.0	126	<0.67	21,131	<2.0	10.0	26.0	37.0	19,749	<0.34	4,151	5,713	272	270	24.0	32.0	<20.0	<1.3	<1.3	41.0	122	Sediment
Bass-1	<0.62	5,917	5.1	43.0	<0.31	101	<0.92	4.8	5.5	4.0	5,676	<0.15	541	819	56.0	147	<6.5	6.3	<9.2	<0.62	<0.62	14.0	12.0	Sediment
Wind-2	<1.2	11,159	6.8	128	0.94	3,173	<1.8	7.1	12.0	9.7	11,050	<0.3	1,235	1,972	128	195	144	20.0	<18.0	<0.59	<1.2	24.0	41.0	Sediment
4th Lake	<0.58	14,551	5.9	103	<0.29	1,812	<0.87	4.9	14.0	7.0	14,858	<0.15	1,180	1,859	32.0	299	11.0	9.3	<8.7	<0.58	<0.58	28.0	18.0	Sediment
SS-1	<0.55	12,561	8.2	407	<0.27	30,636	0.83	15.0	18.0	16.0	24,857	<0.14	2,235	4,260	327	468	16.0	15.0	<8.3	<0.55	<0.55	56.0	36.0	Soil

Table 8
Mobile Waste Controls
Concentrations of Volatile Organic Compounds in Water, Sediment and Soil Matrices
February 20, 1992

MATRIX	WATER	SEDIMENT AND SOIL								
February 20, 1992	acetone	methylene chloride	acetone	2-butanone	bis (2-ethylhexyl) phthalate	1,1-Dichloroethene	trichloroethene	benzene	toluene	chlorobenzene
	ug/L	mg/Kg			ug/Kg					
Bass-2 (1)	8*	45	160	35*	ND	ND	ND	ND	ND	ND
Bass-2 (2)	ND	59	250	50	190	ND	ND	ND	ND	ND
Wind-1 (1)	6	18	33	ND	ND	ND	ND	ND	ND	ND
Wind-1 (2)	ND	28	61	ND	ND	ND	ND	ND	ND	ND
West-1	6*	ND	ND	ND	ND	ND	ND	ND	ND	ND
West-2 (1)	4*	17*	99	ND	ND	ND	ND	ND	ND	ND
West-2 (2)	ND	47	220	34	ND	ND	ND	ND	ND	ND
Bass-1 (1)	5*	NA	21	ND	ND	ND	ND	ND	ND	ND
Bass-1 (2)	ND	ND	80	ND	ND	ND	ND	ND	ND	ND
Wind-2	4*	ND	ND	ND	ND	ND	ND	ND	ND	ND
4th Lake (1)	9*	9	ND	ND	ND	ND	ND	ND	ND	ND
4th Lake (2)	ND	19	ND	ND	ND	ND	ND	ND	ND	ND
4th Lake-MS (1)	ND	27	ND	ND	ND	98	83	90	82	91

MATRIX	WATER								
February 20, 1992	acetone	methylene chloride	2-butanone	bis (2-ethylhexyl) phthalate	1,1-Dichloroethene	trichloroethene	benzene	toluene	chlorobenzene
	ug/L								
4th Lake-MS (2)	4*	ND	ND	ND	53	44	53	47	46

ND - Not Detected
* - Below listed detection limit
(1) Initial sampling analytical results
(2) re-analysis of same sample; dilution factors may change.
MS - Matrix spike

Table 9
Mobile Waste Controls
Concentrations of Semi-Volatile Organic Compounds in Water Matrix
February 20, 1992

MATRIX	WATER											
February 20, 1992	Isophorone	phenol	2-chlorophenol	1,4-dichlorobenzene	N-Nitrosodipropylamine	1,2,4-trichlorobenzene	P-Chloro-M-Cresol	Acenaphthene	4-nitrophenol	2,4-dinitrotoluene	pentachlorophenol	Pyrene
	ug/L											
4th Lake (MS)	ND	98	120	73	64	73	130	71	180	91	120	110
4th Lake (MSD)	ND	94	150	140	110	170	230	160	160	210	160	210

Mobile Waste Controls
Concentrations of Semi-Volatile Organic Compounds in Sediment and Soil Matrix

MATRIX	SEDIMENT AND SOIL											
February 20, 1992	Isophorone	phenol	2-chlorophenol	1,4-dichlorobenzene	N-Nitrosodipropylamine	1,2,4-trichlorobenzene	P-Chloro-M-Cresol	Acenaphthene	4-nitrophenol	2,4-dinitrotoluene	pentachlorophenol	Pyrene
	ug/Kg											
West-1	100*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4th Lake (MS)	ND	1,700	2,100	1,100	400*	1,200	2,200	1,200	1,900*	1,500	ND	1,500
4th Lake (MSD)	ND	1,800	2,200	1,200	440	1,300	2,500	1,300	2,400	1,800	250*	1,900

ND - Not Detected
* - Below listed detection limit
** - Re-analysis of seim-volatile compounds not summarized on this table
MS - Matrix spike
MSD - Matrix spike duplicate

TWC5.WK3

GROUNDWATER PATHWAY AND TARGETS

Characteristics

The Houston area is situated on the Quaternary Coastal Plain of Texas.(ref. 7) Specifically, the site is underlain by the Pleistocene Age, Beaumont Formation.(ref. 8) The Beaumont Formation beneath the site is described as barrier island and beach deposits consisting of mostly clay, silt, and sand. The mapped geologic unit includes mainly stream or river channel, point bar, natural levee, and backswamp deposits and, to a lesser extent, coastal marsh and mud flat deposits with concentrations of calcium carbonate, iron-oxide, and iron manganese oxide nodules in zones of weathering.(ref. 7) The soils beneath the site have been mapped as relict fluvial and deltaic deposits, sand units, locally clayey, that are easily excavated, with low to moderate erosion potential, low shrink-swell potential, high bearing strength, moderate permeability, and low to moderate moisture retention at the surface.(ref. 8)

The site is underlain by the Chicot Aquifer, which is the youngest aquifer of the Coastal Plain of Texas as indicated by the stratigraphic cross-section C-C'.(ref. 9) The Chicot Aquifer includes the following formations: the Willis Sand, the Bentley Formation, the Montgomery Formation, the Beaumont Clay, and any overlying Holocene alluvium. In the vicinity of the site, the Chicot Aquifer reaches an average thickness of approximately 600 feet.(ref. 9) Wells in the vicinity of the site are screened in saturated intervals ranging from 98 to 1,000 feet below surface. Water levels in these wells range from depths of 8.5 to 260 feet below ground surface.(ref. 1)

The local stratigraphy and depth to groundwater were determined during the site evaluation activities performed at the site by REI during 1982 and 1983.(ref. 1, Atch. 7) Six soil borings were logged and completed as monitoring wells during this investigation. The general subsurface stratigraphy beneath the site is alternating layers of clay and sand.(ref. 1) Generally, the uppermost interval, ranging from 7 to 9 feet in thickness, is described as a sandy clay. Beneath this interval is a clayey sand to silty sand unit ranging from 4 to 20 feet in thickness. The stiff, reddish-brown clay interval beneath the sand interval ranges from 10 to 12 feet thick, and the sand unit beneath the reddish-brown clay interval ranges from 2 to 10 feet thick.(ref. 1, Atch. 7) All monitoring wells constructed at the site by REI were screened across this uppermost saturated interval approximately 8 to 25 feet below ground surface.(ref. 1) Table 10 summarizes monitoring wells construction details.(ref. 1)

The monitoring well water levels in the sandy stratigraphic interval screened in wells 2, 3, and 5 correlated with the water levels recorded from Lake Westwind.(ref. 1) In addition, a shallow groundwater mounding effect was reported beneath the covered landfill area, potentially contributing to contaminant migration from the landfill to the west and southwest.(ref. 1) The depth of the landfill excavation averages 13 feet and attains a maximum depth of 16 feet in the southwest corner of the excavation, based on the resistivity survey completed by REI.(ref. 1) Shallow groundwater, occurring from 8-15 feet below surface in the area of the pit excavation (based on monitoring well depths), would therefore come in contact and potentially be contaminated by the buried waste materials.(ref. 1)

Table 10 Mobile Waste Controls
Summary of Well Construction Details for Monitoring Wells[ref. 1, Atch. 7]

Well ID	Boring Depth	Well Material	Screened Interval	Screen Length	Well Diameter
MW-1	20'	PVC	5-15'	10'	4"
MW-2	25'	PVC	8-18'	10'	4"
MW-3	29'	PVC	6-24'	18'	4"
MW-4	23'	PVC	8-20'	12'	4"
MW-5	17'	PVC	12.5-17'	4.5'	4"*
MW-6	16'	PVC	6-16'	10'	2"

* As-built well diagram (reference 1, attachment 7) indicates well diameter is 4 inches, although diagram scale used resembles 2-inch diameter well.

The municipal or domestic wells located nearest to the site are screened at intervals of 85 to 105 feet below ground surface.(ref. 1) These wells were installed for domestic or irrigation water use.(ref. 1) The average groundwater yield data for the water wells near the site in the saturated interval from 85 to 105 feet below surface is approximately 30 gpm (Table 11). The general groundwater flow direction in the vicinity of the site mimics geologic dip and is toward the southeast.(ref. 9) The saturated intervals encountered while drilling in the vicinity of the site are all considered part of the Chicot Aquifer.(ref. 9) Based on available driller's logs, wells are screened at three primary depths in the Chicot Aquifer, 8-25 feet (monitoring wells), 88-103 feet, and 440-470 feet below surface. Groundwater quality data for the shallow saturated interval in the vicinity of the site are reported above. Static water levels recorded on water well drilling records for the domestic wells located on East Haven and Lambright roads were reported to be 27 feet below surface.(ref. 1) These two wells were drilled and completed in what is apparently an equivalent thick sand deposit that was mined at the site. The excavated sand pits are now water filled and used for recreational purposes.(ref. 1) The water well drilling records identify sand and clay depths and thicknesses encountered while drilling. Both wells averaged a sand percentage ranging from 75 to 85 percent. The potential for a hydraulic connection between the relatively thick sand deposits encountered at the two domestic wells at East Haven and Lambright roads and the sand units intercepted by the waste pit sidewalls will be investigated during the sampling program.

Results of subsurface soil testing conducted prior to the construction of the Windmill Lakes Subdivision and Windmill Lakes Boulevard indicate that the uppermost sandy clay (occurring at approximately 8 feet below ground surface) is a low plasticity clay with liquid limits of approximately 28 percent and a plasticity index (PI) of approximately 16 percent. The percentage of soil particles passing the No. 200 sieve was approximately 60 percent. The clayey to silty sand interval beneath the uppermost sandy clay consists of approximately 93 to 70 percent soil grains that do not pass through a No. 200 sieve. This interval was saturated during soil boring activities; depth to water ranged from 5.5 to 12.5 feet below surface. The clayey to silty sand interval exhibited a laboratory vertical permeability in the range of 1×10^{-5} cm/sec.(ref. 1)

The clay interval beneath the clayey to silty sand unit occurs at approximately 25 feet below ground surface. This clay exhibited liquid limits which ranged from 60 to 85 percent, plasticity indices ranging from 39 to 57 percent, and 96 percent of the clay samples analyzed did not pass the No. 200 sieve. The clay samples tested exhibited a laboratory vertical permeability in the range of 1×10^{-9} to 7×10^{-8} cm/sec.(ref. 1) No surface soil samples are known to have been collected for analytical testing.

Targets

Two hundred seventy-eight private, irrigation, industrial, municipal and monitoring wells are located within a four-mile radius of the site.(ref. 1) Sixteen private and irrigation wells are located within a 1-mile radius of the site. In addition, eight monitoring wells were installed within the 1-mile radius of the site to monitor local

TABLE II
MOBILE WASTE CONTROLS
SUMMARY OF WATER WELLS WITHIN 1-MILE

WELL ID #/ LOCATION	WELL TD	SCREENED INTERVAL	TOTAL SAND/GRAVEL THICKNESS **	TOTAL CLAY THICKNESS	STATIC WATER LEVEL	CHEMICAL ANALYSIS	FLOW RATE	WELL USE
65-31-1C / 10121 WINDMILL LAKES BLVD. HOUSTON, TX	470'	440-470	208	262	200	NO	N / A	IRRIGATION
65-22-6 / 10121 WINDMILL LAKES BLVD. HOUSTON, TX	470'	440-470	208	262	200	NO	N / A	IRRIGATION
65-31-1E / 10039 RADIO ROAD HOUSTON, TX	450'	440-450	126	321	160	NO	JETTED / 25 gpm	DOMESTIC
65-31-1E / 10035 RADIO ROAD HOUSTON, TX	103'	93-103	61	40	10	NO	JETTED / 30 gpm	DOMESTIC
65-31-1B / 9913 EASTHAVEN HOUSTON, TX	94'	88-94	81	11	27	NO	DEEP WELL JET / 500 gph	DOMESTIC
65-31-1C / 9421 LAMBRIGHT HOUSTON, TX	94'	88-94	74	19	27	NO	DEEP WELL JET / 900 gph	DOMESTIC
65-31-1L / 11400 GULF FREEWAY HOUSTON, TX 77034	90'	88-90	26	64	12	NO	N /A	DOMESTIC

** DOES NOT INCLUDE FILL OR TOP SOIL.

TABLE II
MOBILE WASTE CONTROLS
SUMMARY OF WATER WELLS WITHIN 1-MILE

WELL ID #/ LOCATION	WELL TD	SCREENED INTERVAL	TOTAL SAND/GRAVEL THICKNESS **	TOTAL CLAY THICKNESS	STATIC WATER LEVEL	CHEMICAL ANALYSIS	FLOW RATE	WELL USE
65-31-4C / 9905 RADIO ROAD HOUSTON, TX 77075	345'	325-345	105	237	190	NO	JETTED / 25 gpm	DOMESTIC
65-30-3F / 10305 MOERS HOUSTON, TX 77075	231'	90-100	61	166	12	NO	JETTED / 35 gpm	DOMESTIC
65-30-3E / LAMBRIGHT HOUSTON, TX	98'	90-98	58	37	6	NO	BLOW W/COMPRESSOR BY DRILLS / 125 gpm	DOMESTIC
65-30-3E 9917 RADIO ROAD HOUSTON, TX 77304	348'	347 1/2-348	121	224	190	NO	JETTED / 75 gpm	DOMESTIC
65-30-3E / 9718 MOERS ROAD HOUSTON, TX 77034	87'	80-87	52	35	18	NO	N / A	DOMESTIC
65-30-3F / LAMBERT HOUSTON, TX	348'	338-348	86	259	183	NO	JETTED / 60 gpm	INDUSTRIAL
65- -3F / MYKOWIA ROAD HOUSTON, TX	94'	86-94	37	55	18	NO	AIR COMPRESSOR / 35 gpm	DOMESTIC
65-23-7F / 9731 RADIO ROAD HOUSTON, TX 77034	352'	325-340	113	235	170	NO	SUBMERSIBLE / 13 gpm	DOMESTIC

** DOES NOT INCLUDE FILL OR TOP SOIL.

TABLE 11
MOBILE WASTE CONTROLS
SUMMARY OF WATER WELLS WITHIN 1-MILE

WELL ID #/ LOCATION	WELL TD	SCREENED INTERVAL	TOTAL SAND/GRAVEL THICKNESS **	TOTAL CLAY THICKNESS	STATIC WATER LEVEL	CHEMICAL ANALYSIS	FLOW RATE	WELL USE
65-23-7G / 11412 GULF FREEWAY HOUSTON, TX	350'	330-350	50	295	185	NO	N / A	DOMESTIC
65-22-9R / 9924 RADIO ROAD HOUSTON, TX 77075	105'	95-105	73	29	29	NO	JETTED / 15 gpm	DOMESTIC
65-30-3 / 9205 WAYFARRER HOUSTON, TX	454'	444-454	81	370	215	NO	JETTED / 75 gpm	DOMESTIC
65-15-4 / 9825 RADIO ROAD HOUSTON, TX 77075	340'	330-340	62	275	175	NO	JETTED / 30 gpm	DOMESTIC

** DOES NOT INCLUDE FILL OR TOP SOIL.

groundwater quality. Static water level measurements for these wells, including monitoring wells, ranged from 6 to 215 feet below surface. The wells were completed within the Chicot Aquifer.(ref. 1) A summary of the characteristics of the wells located within a 1-mile radius of the site is presented as Table 11.

There is no analytical evidence indicating that any drinking water well has been contaminated by hazardous substances from the site.(ref. 11) In October 1991, a domestic well located at 9917 Radio Road was sampled by the TWC and analyzed for TOC and metals analyses. The TWC reported less than 5 ppm TOC and no metals in the sample collected.(ref. 1) One wellhead protection area is within a 4-mile radius of the site, the City of Houston Sagemont #2 well located approximately 2 miles southeast.(ref. 1)

For wells within a 4-mile radius of the site:

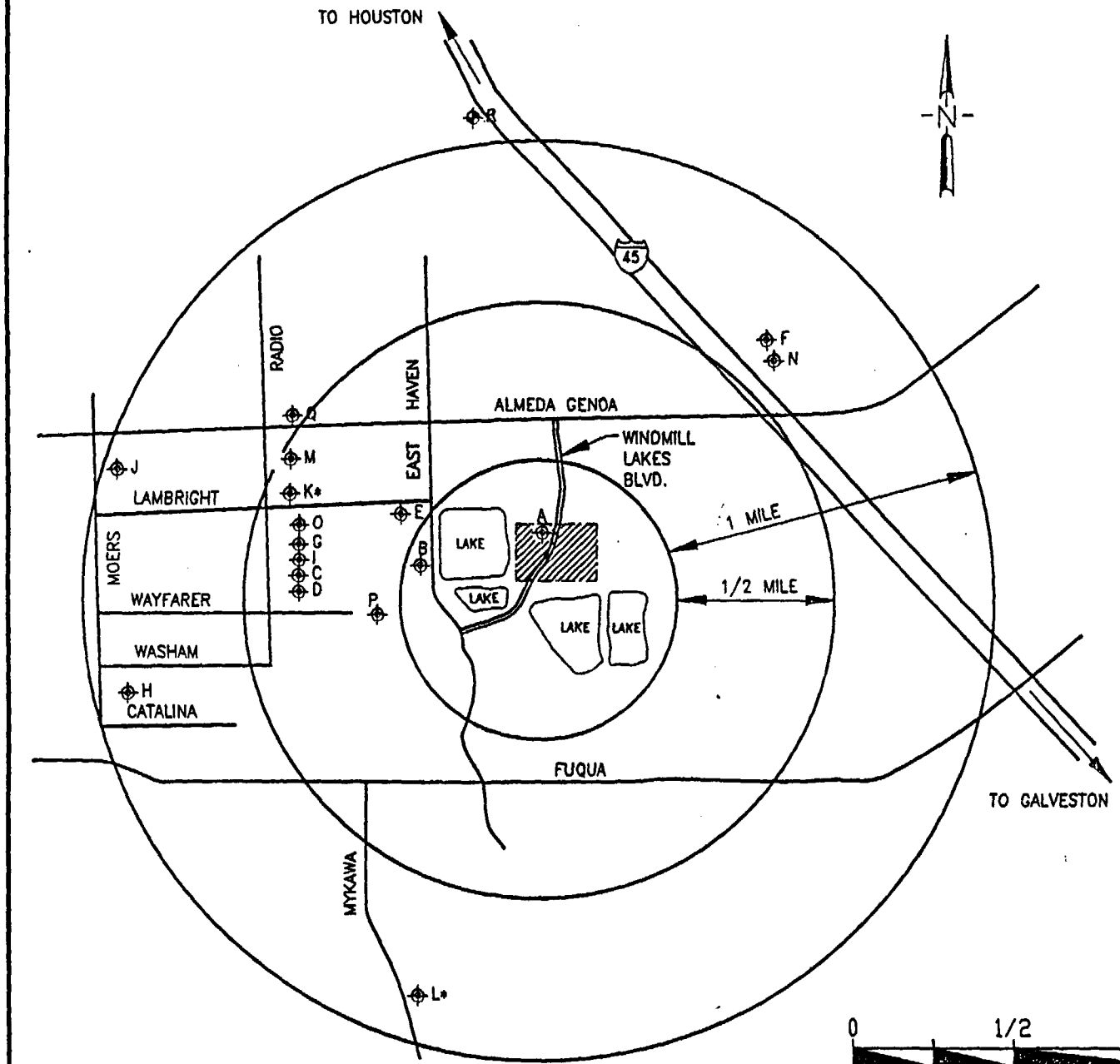
- Within 0 - 0.25 miles of the site there are 2 domestic wells, 2 irrigation wells, and 8 monitoring wells.
- Between 0.25 - 0.50 miles, there are 7 private wells.
- Between 0.5 - 1.0 miles, there are 7 private wells
- Between 1.0 - 2.0 miles, there are 4 municipal supply wells, 70 private wells, 8 industrial wells, and 3 monitoring wells.
- Between 2.0 - 3.0 miles, there are 4 municipal supply wells, 59 private wells, and 11 industrial wells.
- Between 3.0 - 4.0 miles, there are 6 municipal supply wells, 76 private wells, and 13 industrial wells.
- There are 14 municipal supply wells within the 4-mile radius of the site.(ref. 1)

The locations of the domestic wells located within 1 mile of the site are indicated on Figure 3.(ref. 1) Details of well construction, well use, pumpage rates, thicknesses of the sand and clay intervals of the Chicot aquifer, and static water levels for wells located within 1 mile of the site are summarized in Table 11.(ref. 1) The screened intervals of wells in the vicinity of the site, excluding monitoring wells, range from 80 to 470 feet below ground level. The logs of the wells in the vicinity of the site is describe the formation as alternating layers of sand and clay of the Chicot formation. The well installed through the greatest thickness of sand is located at 9913 East Haven Road in Houston, Texas. This well is within 0.25 mile of the site. The static water level of this well was 27 feet below ground surface. A pump test was not conducted during well development.(ref. 1) The number of people served by the 16 domestic wells within 1 mile of the site is approximately 38.4 using the population factor (2.4 residents per household) developed during the PA.(ref. 1) The groundwater population target calculations for distance increments were performed for the area within 1 mile of the site and are shown in Table 12.(ref. 1)

? NO SENSE

The sources of the City of Houston and Kirkmont M.U.D. municipal water supply in the vicinity of the site are Houston-Galveston Coastal Subsidence District (HGCSD) well numbers 1094 and 1717.(ref. 1) The population served by this water supply is 9,843.(ref. 1) This information is summarized in Table 12.

ES ENGINEERING-SCIENCE



LEGEND

* UNDOCUMENTED HOUSE NUMBERS LOCATION TO BE VERIFIED

NA NOT AVAILABLE

MONTORING WELL LOCATION

DOMESTIC SUPPLY WELL LOCATION

APPROXIMATE AREA OF CLOSED LANDFILL

WELL DESIGNATIONS--ADDRESSES

A – 10121 WINDMILL LAKES BLVD.
B – 9913 EAST HAVEN
C – 10035 RADIO RD.
D – 10039 RADIO RD.
E – 9421 LAMBRIGHT
F – 11,400 GULF FREEWAY
G – 9905 RADIO RD.
H – 10305 MOERS RD.
I – 9917 RADIO RD.
J – 9718 MOERS RD.
K – NA LAMBRIGHT RD.
L – NA MYKAWA
M – 9731 RADIO RD.
N – 11,412 GULF FREEWAY
O – 9924 RADIO RD.
P – 9205 WAYFARER
Q – 9625 RADIO RD.
R – 3MW 145/CLEARWOOD

0 1/2 1
SCALE FEET

FIGURE 3

WELLS WITHIN 1 MILE RADIUS OF SITE

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

S10-WELL 9/17/92

Table 12 Mobile Waste Controls Ground Water Population Target Calculations[1]
August 28, 1992

Mile Radius	Type Well	No. Wells		Pop. Factor	Target Totals
0-0.25	Domestic	2	X	2.4	4.8
	Public Supply	0			0.0
	Industrial	0			0.0
	Irrigation	2	X	0	0.0
	Monitoring	6	X	0	0.0
Totals		10			4.8
0.25-0.50	Domestic	7	X	2.4	16.8
	Public Supply	0			0.0
	Industrial	0			0.0
	Irrigation	0			0.0
Totals		7			16.8
0.50-1.00	Domestic	7	X	2.4	16.8
	Public Supply	0			0.0
	Industrial	0			0.0
	Irrigation	0			0.0
Totals		7			16.8
1.00-2.00	Domestic	70	X	2.4	168.0
	Public Supply	4	X	2,735.0	10,940.0
	Industrial	8			0.0
	Irrigation	0			0.0
	Monitoring Wells	3			0.0
Totals		85			11,108.0

[1] EXPLANATION

- City of Houston (Jim Bell, [713] 223-1095), District 53, HGCSD Well No. 1040: 0.17 miles from site; well plugged in the 1970s. Target = 0. (ref. 1, Atch. 2)
- City of Houston (Jim Bell, [713] 223-1095), District 61 #1, HGCSD Well No. 1048: 0.93 miles from site; well plugged in 1991. Target = 0.
- Houston Lighting and Power Company, 4500 Shaver (Gene Fisseler, [713] 228-9211), South Houston Substation, HGCSD Well No. 1202: 0.76 miles from site; restroom facilities used by HL&P crews 7 days per week (estimated 42,000 gallons annual production). A minimum of one 3-person truck crew uses the station each day. Three people x 365 days = Target = 1,095.
- American Savings, State Well No. 65-31-1k: could not locate facility; Target = unknown.
- King of Kings Lutheran Church (Judy Griffin), State Well No. 65-23-7: two full-time employees with an average of 100 church members in attendance each Sunday. Target = 2.
- City of Houston (Jim Bell, [713] 223-1095), Sun Valley, HGCSD Well No. 1134: 1.23 miles from site; well plugged prior to 1980. Target = 0.
- City of Houston (Jim Bell, [713] 223-1095), Gulf Palms, HGCSD Well No. 1059: 1.87 miles from site; well plugged prior to 1980. Target = 0.

Table 12, continued

- City of Houston (Jim Bell, [713] 223-1095), Sagemont #2, HGCSD Well No. 1094: 1.88 miles from site; well is used as a standby well to provide water to the Sagemont area (approx. 5 square miles) should the surface water distribution line fail. This well can produce 850 gpm. Five (5) square miles x 1,584.62 residents per square mile for Harris County = Target = 7,923.
- Kirkmont M.U.D. (P. John Kuhl, [713] 850-9000), HGCSD Well No. 1717: 1.96 miles from site; public supply well with approximately 800 connections; Ray Cherry is district operator. 800 x 2.4 residents per Harris County household = Target = 1,920.

Required Information (Data Gaps)

- Field verification to determine the location of existing wells and confirm the absence of additional water wells within a 1-mile radius of the site.
- Sample data required for local domestic wells to determine if contaminants have migrated through groundwater to the residential neighborhoods west of the site.
- Field or telephone verification of the number of people served by the 16 domestic water wells located within a 1-mile radius of the site.
- Field determination of level measurements obtained from nearby groundwater monitoring wells to develop groundwater elevation maps, illustrate groundwater flow conditions, and to assess the relationships of the groundwater to the elevation of the disposal pit. Survey data is also required to determine elevations of monitoring well measuring points and calculate groundwater elevation.
- Sample data to determine if subsurface contamination is present in soil and groundwater beneath the landfill.

SURFACE WATER PATHWAY AND TARGETS

What about SW use of the Windmill lakes

Characteristics

The site is located in the San Jacinto-Brazos Coastal Basin, Segment 1102.(ref. 1) This segment, Clear Creek Above Tidal, is classified as water quality limited and is 44 miles in length and drains an undetermined area.(ref. 12) Thirty-one permitted outfalls discharge a total of 30.44 millions of gallons per day (MGD) to Segment 1102, including 23 domestic (30.35 MGD) and 8 industrial (0.09 MGD) outfalls. There are two TWC ambient surface water quality monitoring stations, 1102.0100 and 1102.0200, for this segment. Surface water quality data for Segment 1102 are presented in Table 13.(ref. 12)

This is a GW-SW release

Areal drainage in the vicinity of the site is generally to the southwest, in the direction of the small lakes formed from excavated sand pits.(ref. 1) In addition, surface water drainage may also occur southwestward along Windmill Landing Boulevard toward the Harris County drainage ditch. The site is located outside the 500-year floodplain.(ref. 1) The 2-year, 24-hour rainfall event in the area of the site is 5.5 to 6.0 inches (ref. 13) with an average annual rainfall rate of 44.76 inches.(ref. 14)

The lake are used for Rec. Are the lake use for fishing

The filled landfill pit (Area A, Figure 1) is located north and east of four lakes created by sand quarrying operations.(ref. 1) The lakes have been filled by precipitation, surface water run-off and groundwater seepage.(ref. 1) A potential surface water pathway exists that would allow surface water to drain across and through the fairly thin and, in places, breached, landfill cap material into the nearby lakes.

Figure 4 shows the drainage pathway of surface run-off to a Harris County Water Control and Improvement District (WCID) drainage ditch. This drainage ditch is designated as intermittent on the USGS topographic map.(ref. 17) Surface water flows in this ditch for approximately 5 miles downstream to the confluence

Table 13 Mobile Waste Controls October 1, 1985, Through September 30, 1987
TWC Water Quality Information for Segment 1102[ref. 12]

Parameter	Criteria	Number Samples	Minimum	Maximum	Mean	Number of Values Outside Criteria	Mean Values Outside Criteria
Dissolved Oxygen (mg/L)	5.0	27	4.5	17.0	8.4	3	4.8
Temperature (°F)	95.0	27	54.3	87.8	72.1	0	0
pH	6.5 - 9.0	24	7.1	8.6	7.9	0	0
Chloride (mg/L)	200	27	31	224	137	2	218
Sulfate (mg/L)	100	25	21	120	43	1	120
Total dissolved Solids (mg/L)1	600	25	191	630	492	2	626
Fecal Coliforms (#/100 mL)	200	25	10	15,000	231	15	619

1 Total dissolved solids were estimated by multiplying specific conductance by .50.

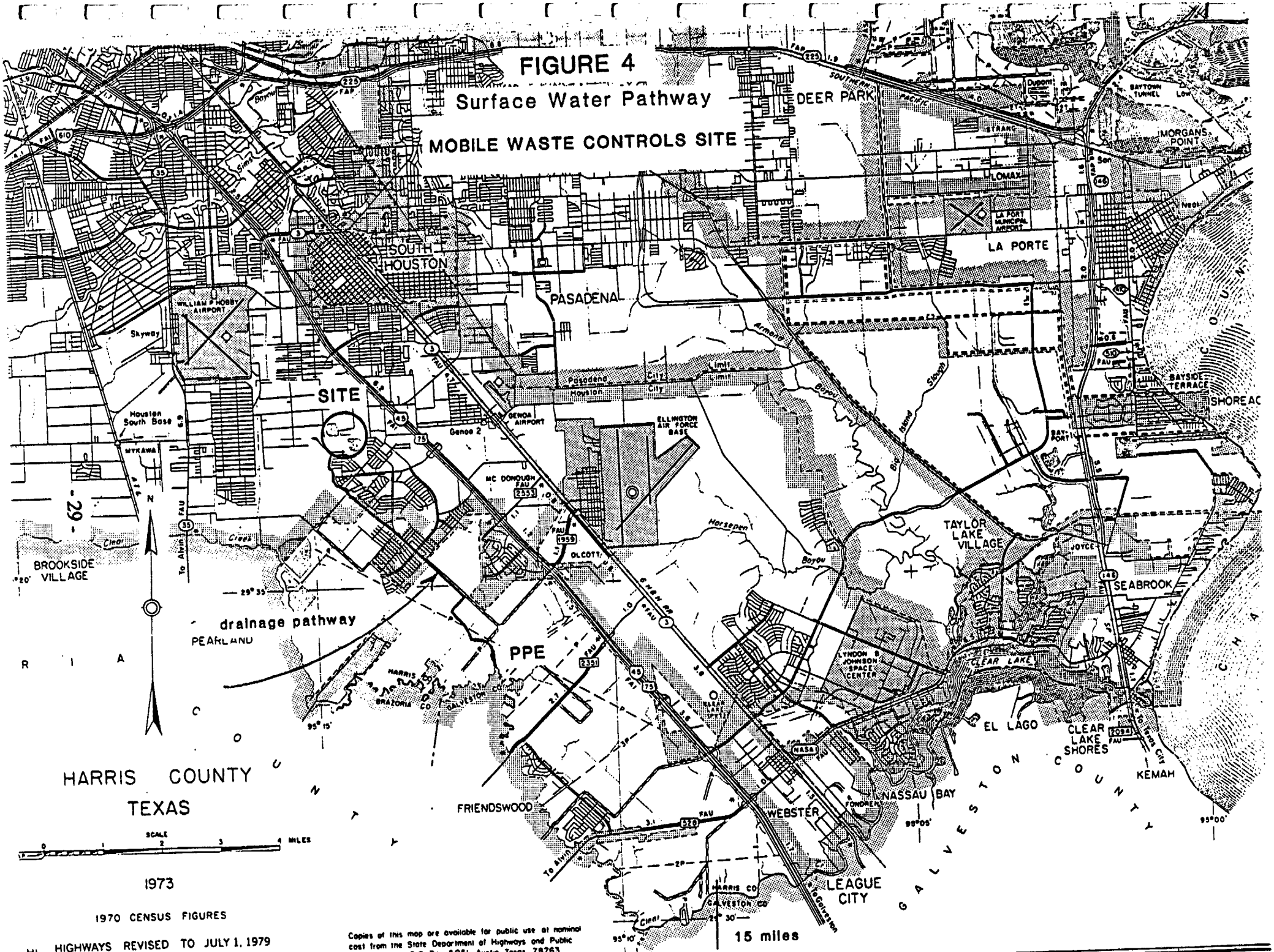


FIGURE 4
Surface Water Pathway
MOBILE WASTE CONTROLS SITE
SITE
PPE
drainage pathway
HARRIS COUNTY
TEXAS
SCALE
0 1 2 3 4 MILES
1973
1970 CENSUS FIGURES
HIGHWAYS REVISED TO JULY 1, 1979
Copies of this map are available for public use at nominal cost from the State Department of Highways and Public Transportation, P O Box 5051, Austin, Texas 78763
15 miles
DEER PARK
LA PORTE
PASADENA
SOUTH HOUSTON
WILLIAM P HOBBY AIRPORT
Houston South Base
ELLINGTON AIR FORCE BASE
GENOA AIRPORT
LA PORTE MUNICIPAL AIRPORT
MORGANS POINT
BAYSIDE TERRACE
SHOREACRES
TAYLOR LAKE VILLAGE
SEABROOK
BROOKSIDE VILLAGE
PEARLAND
LYNDON B JOHNSON SPACE CENTER
CLEAR LAKE
EL LAGO
CLEAR LAKE SHORES
KEMAH
NASSAU BAY
WEBSTER
FRIENDSWOOD
LEAGUE CITY
GALVESTON COUNTY
HARRIS COUNTY
BRAZORIA CO
GALVESTON CO
29° 35'
95° 15'
95° 05'
95° 00'
29° 30'
95° 10'
- 29 -

with Clear Creek.[ref. 1] The probable point of entry (PPE) is marked on Figure 4. From that point, flow is 15 miles downstream toward the Gulf of Mexico through Clear Creek Tidal (Segment 1101) and Clear Lake (Segment 2425). Since the drainage ditch is intermittent, a surface water pathway from the site to Clear Creek does not appear to exist. Drainage discharge of Clear Creek is 26,150 acre ft/yr [ref. 1, p. 20] with an average flow of about 36.1 cubic feet per second (cfs).[ref. 1] Low flow for Segment 1102 is not known.

This is not the SW pathway! overland pathway is > 2mi ?

Targets

The designated water uses for Segment 1101 and Segment 2425 of the San Jacinto-Brazos Coastal Basin are contact recreation.[ref. 13] The Clear Creek Tidal segment, 14 miles in length, does include a portion of the 15 downstream miles from the site and is designated as a domestic water supply.[ref. 12]

Fisheries, wetlands, or habitats for threatened and endangered species within a 4-mile radius of the site are *Bufo houstonensis* (Houston Toad), *Tympanuchus cupido attwateri* (Attwater's Greater Prairie Chicken), *Opheodrys vernalis* (Smooth Green Snake), *Chloris texensis* (Texas windmill grass), *Machaeranthers aurea* (Houston machaeranthera), *Nerodia fasciata clarkii* (Gulf Salt Marsh Snake), and *Rana areolata* (Crawfish frog).[ref. 1]

SW is the abd lake's (sandpits

The topography of the site indicates a mounding in the general location of the closed landfill.[ref. 1, Atch. 7] Reportedly, the landfill area is slightly raised due to past closure activities.[ref. 1, Atch. 7, p. 6] The topographic land surface reaches a maximum of 48 feet (MSL) and falls to approximately 40 feet (MSL) near the northern extremity of the site. South and west of the closed landfill area, the land surface is approximately 44 feet (MSL) so that surface water drainage patterns are west and south of the area of the landfill cap.[ref. 1, Atch. 7, p. 6] Surface water can be expected to flow into the lakes located to the west and south of the closed landfill area, based on land surface elevations. The lakes surrounding the site are frequently used for fishing, swimming, and boating.[ref. 1]

Precipitation and ponded surface water over the landfill will infiltrate into the landfill cover, especially in areas where the cap has been breached. Groundwater mounding was reported beneath the covered landfill area.[ref. 1] The upper saturated sandy interval that intersects the sidewalls of the landfill pit could channel subsurface flow in the direction of local groundwater flow, potentially controlled by the groundwater mounding (recharge) noted during the investigations completed by REI.[ref. 1] As the potentially contaminated shallow groundwater moves under the influence of hydrostatic head, the outcrop of the saturated interval along the sidewalls of the four excavated sand pit areas, now lakes, may form seeps or springs that feed the surface waters of the lakes.

Required Information (Data Gaps)

- Consultation with the Texas Parks and Wildlife Department (TPWD) to determine the occurrence of *Bufo houstonensis* (Houston Toad), *Tympanuchus cupido attwateri* (Attwater's Greater Prairie Chicken), *Opheodrys vernalis* (Smooth Green Snake), *Chloris texensis* (Texas windmill

grass), *Machaeranthers aurea* (Houston machaeranthera), *Nerodia fasciata clarkii* (Gulf Salt Marsh Snake), *Rana areolata* (Crawfish frog), endangered species, within a 4-mile radius of the site. TPWD can also provide fish production estimates for the lakes and rivers in the drainage route from the site.

- Field determination to assess the existence of groundwater to surface water flow from groundwater seeps and springs that may enter the lakes.
- Field verification to determine the location of ditches and on-site and off-site drainage patterns in relation to the landfill cap and the lakes surrounding the site. Also, verification that the drainage ditch is not perennial stream.
- Records review to determine the flow rate for Clear Creek segment and the total basin drainage area for the Clear Creek Above Tidal segment.
- Sample data to attribute surface water pathway contaminants to the site source.

SOIL EXPOSURE PATHWAY AND TARGETS

Characteristics

During a TWC site inspection, stressed and bare vegetation areas were noted over the site and in the area of monitoring well 2 at the western edge of the closed landfill and adjacent to Lake Westwind.(ref. 1, Atch. 5 and Atch. 4) These areas are potential soil exposure pathways. Surface exposed wastes and stressed vegetation have been documented at the site.(ref. 1)

The closed, 25-acre landfill site is a maintained, open, landscaped, grass field, and public access is not restricted.(ref. 1) Off-site runoff patterns are to the southwest and possibly to the north.(ref. 1, Atch. 7 and Atch. 5)

Targets

The site is accessed by Windmill Lakes Boulevard, Windwater Road, East Haven Road, and Minnesota Street. There are no fences to inhibit access to the approximately 25-acre area of the closed and capped landfill (Figure 1, Area A). There is a fenced, locked, boat storage area constructed on top of the southwest corner of the closed landfill (Figure 1). Access to boating on the lakes is restricted to residents of the area. Security related to the apartment complexes is not known.

Adjacent land use to the site is residential and recreational. Three groups of apartments were constructed adjacent to the site.(ref. 1, p. 23 and Figure 1) The approximate total population of the apartments is 1,950.(ref. 1, p. 23) An estimated 299 total units from the three apartment complexes surrounding the closed landfill area are located within 200 feet of the site. There are no schools within 200 feet of the site.(ref. 1) Beverly Hills Intermediate School is the nearest school and is located approximately ½ mile from the site.(ref. 17) The enrollment at Beverly Hills Intermediate School is not known.

Terrestrial sensitive environments on or within off-site runoff pathways from the site are not known. Habitats for threatened and endangered species have been identified within a 4-mile radius of the site.(ref. 1)

Required Information (Data Gaps)

- Field verification of drainage patterns and soil exposure pathways surrounding the closed landfill site.
- Sample data to determine the existence of hazardous substances in surface soils identified by stressed vegetation.
- Sample data to attribute soil contaminants to the site source, which is landfill leachate or landfill contents.
- Consultation with Texas Department of Parks and Wildlife to determine presence of terrestrial sensitive environments on or within off-site runoff pathways. Field verification required to determine if sensitive environments or endangered species exist on site.
- Verification of the distance to the nearest school or day care center and enrollment figures.
- Determination of cap thickness.

AIR PATHWAY AND TARGETS

Characteristics

Surface soil contaminated from the contaminants within the closed landfill area and volatile contaminants within the closed landfill or leachate are potential sources to the air pathway. Release of strong petroleum/chemical odors were reported from bare soil areas at the site.(ref. 1) Based on wind rose information for this area, dusting is anticipated to be occasional. The wind rose for Houston, presented in Figure 5, indicates that the winds are predominantly from the south and southeast, with wind speeds of 11 to 16 knots about 10 percent of the time.(ref. 15)

The Texas Air Control Board, Austin and the District 7 (Bellaire) office, and the City of Houston, Bureau of Air Quality Control do not have reports of observed releases from the site, reports of adverse health effects, or other records on file for the site.(ref. 16)

Targets

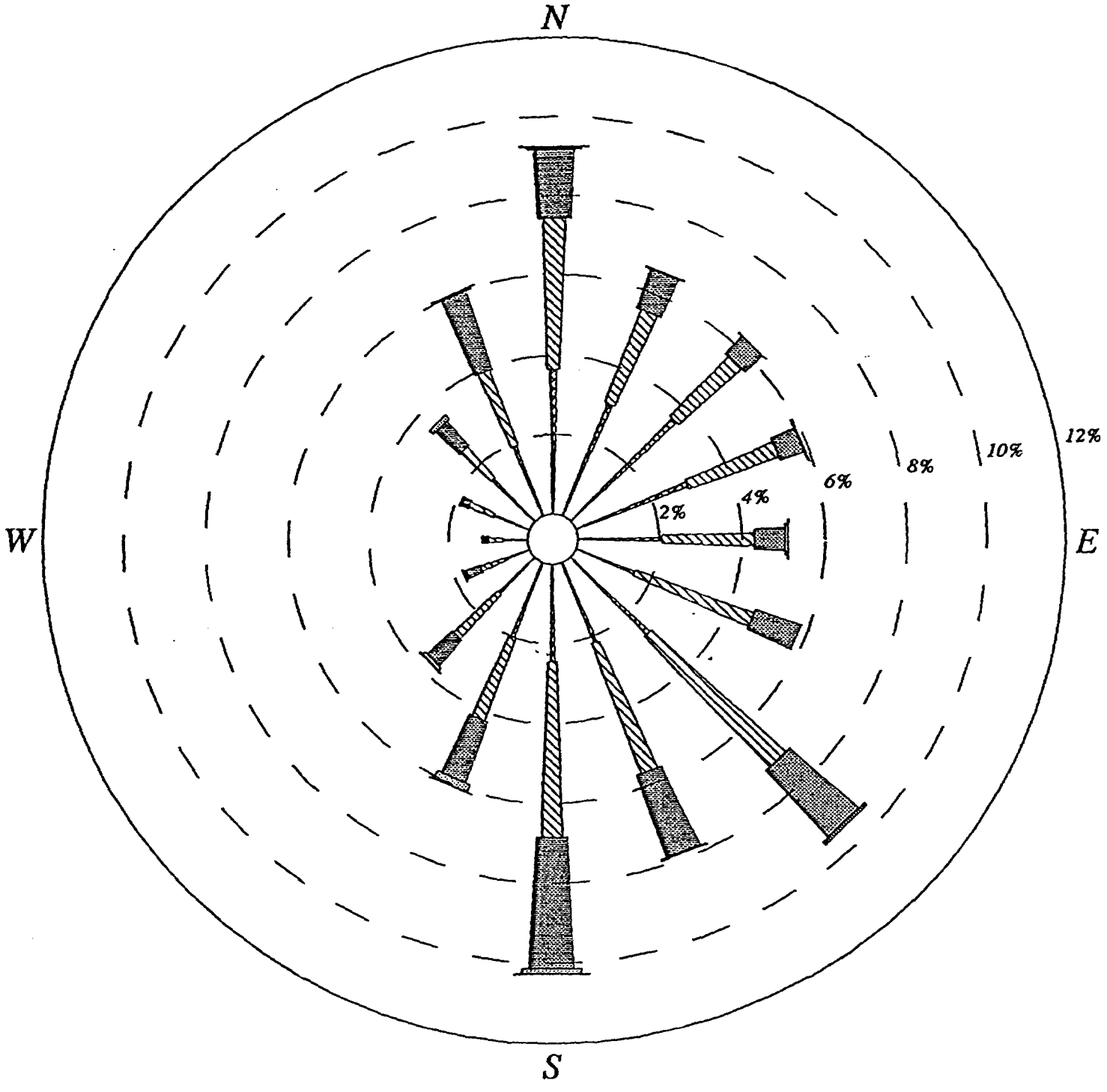
The population within a 4-mile radius of the site is estimated to be 50,000 people.(ref. 1, p. 23) The nearest school, Beverly Hills Intermediate School, is located about 0.56 miles southeast of Windmill Lake, one of the lakes located along the southern boundary of the site.(ref. 17) The nearest park, the Beverly Hills Park is located about 0.20 miles southeast of the site.(ref. 17) The location of the nearest residence is the Windmill Lakes Apartments. Approximately 811 apartment units, containing 1,946 residents are located adjacent to the site. The nearest individual subject to exposure from a release of hazardous substances through the air is not known at this time. There are no National Parks or National Monuments within a 4-mile radius of the site.(ref. 18) Endangered or threatened species are historically known to exist within a 4-mile radius of the site, although they have not been absolutely identified as occurring within this area.(ref. 1) Sensitive environments have been identified within the 4-mile target distance from the site.(ref. 1)

FIGURE 5

HOUSTON

WIND ROSE

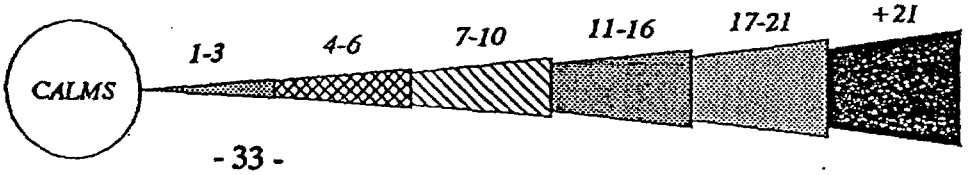
January 1-December 31; Midnight-11 PM



CALM WINDS 9.00%

WIND SPEED (KNOTS)

NOTE: Frequencies indicate direction from which the wind is blowing.



Required Information (Data Gaps)

- Field verification of the existence of sensitive environments within a 4-mile radius of the site, and the existence of endangered species onsite.
- Field identification of the nearest resident subject to exposure from a release of hazardous substances through the air.
- Verification that there have been no reports of adverse health effects potentially resulting from releases of hazardous substances from the landfill into the air.
- Sample data from surface soil to attribute air releases to site source.

SECTION 3

SITE NON-SAMPLING DATA COLLECTION AND FIELD WORK

Engineering-Science will perform the activities described in this section to provide site background information and analytical data that can be used by the EPA to evaluate the site using the hazard ranking system (HRS). Soil, sediment, and groundwater sampling will be performed as discussed below.

All field work will be conducted in accordance with the health and safety plan (HSP) and the TWC-approved project quality assurance plan (QAPP). The HSP and QAPP are in appendixes C and D, respectively. These plans will be reviewed upon arrival at the site.

PERSONNEL REQUIREMENTS AND RESPONSIBILITIES

The TWC project manager for this screening site inspection is Allan Seils. The ES project manager is Brian Vanderglas, and Kelly Krenz of ES is the site investigation manager. ES's mailing address is 7800 Shoal Creek Boulevard, Suite 222 West, Austin, Texas 78757.

The ES site investigation manager and project manager are responsible for identifying, assigning, and organizing the staff to execute the activities required to complete the SSI. The site investigation manager is responsible for completing the activities described in this plan and adhering to the site inspection and report schedule. The schedule for activities at the Mobile Waste Controls site is presented in Table 14.

The ES project manager reviews all major reports and provides technical and administrative support to the site managers. The TWC project manager reviews the work plan and final report and approves the final versions. In addition, the TWC may provide oversight for field activities during the investigation.

COMMUNITY RELATIONS

Prior to the start of any work at the site, Engineering-Science will inform the TWC District 7 office of the field work schedule. The City of Houston and Harris County officials will also be notified, as necessary, of the investigation. ES will make no other formal notifications of SSI activities. Any requests for information which ES receives from the above will be referred to the TWC project manager unless those requests have a direct bearing on ES's ability to safely and effectively conduct the inspection. Any requests for information by the news media or parties

Table 14 Mobile Waste Controls Site
Field Schedule

Time	Activity
Day 1	
0800	Leave ES Houston office for the TWC
0830	Arrive at City of Houston office and TWC
1330	Conduct interviews with TWC representatives
1430	Drive to site; conduct perimeter survey
1800	End of day
Day 2	
0730	Review health and safety plan
0900	Meet with site personnel. Conduct interview and site reconnaissance
1200	Lunch
1300	Complete site visit (if necessary). Review and modify onsite sampling plan
1500	Begin obtaining permission to sample offsite wells or locations, if any
1800	End of day
Day 3	
0730	Review health and safety and sampling plans
0830	Onsite sampling
1200	Lunch
1300	Offsite sampling and sample packaging
1700	Sample shipping (Federal Express drop-off in Houston near Hobby Airport by 2015 Monday through Friday; 1700 on Saturday)
1800	End of day
Day 4	
0730	Review health and safety and sampling plans
0830	Complete on- or off-site sampling and packaging, as necessary
1200	Lunch
1300	Sample shipping
1900	End of day

not associated with the site also will be directed to the TWC project manager or designee.

The TWC will provide each member of the ES inspection team and the ES project manager with letters of introduction describing the authorization given to ES personnel to conduct this SSI. The TWC will also send a notification letter to the site representatives informing them of the impending SSI field work, and obtain access authorization for ES inspectors to the site. ES will set up the site visit after receiving access authorization from the TWC.

WORK PLAN ACTIVITIES

Task 1: Nonsampling and Sampling Activities and Rationale

The field team will meet with Debbie Gomez, Environmental Specialist, of Brown and Caldwell, to access the site. Questions about past and current site operations will be addressed through a phone interview with Marty Sanderlin (TWC) if he is unavailable for the site visit, and through meetings or phone interviews with City of Houston representatives. The meeting will include a tour of the site facilities and a review of available documentation of recent site activities and hazardous substance handling practices.

Any nonsampling data gaps and other items will be addressed based on the interview and reconnaissance. Specifically, the field team will look for previously unidentified sources and any indications of releases. The site manager will record observations in a logbook, while the second ES representative monitors the air with a photoionization detector (PID), flame ionization detector (FID), methane gas detector or Mini-Ram. Hand augers will be used to determine if the cap over the site is less than 1-foot thick. Adjacent properties and other nearby sites of interest, including possible water wells, will be reviewed during reconnaissance activities, and details relating to the presence of sources or pathway to or from neighboring sites will be documented.

Upon completion of the site reconnaissance, the field team will review the tentative sampling plan. The sample locations will be adjusted as necessary to ensure that the samples provide sufficient data for a complete evaluation of the site. Photographs will be taken to document site conditions and support observations reported in the log book.

Photographs have particular documentation requirements. Photographs will be keyed to a site sketch to identify the direction of view and location from which each photograph was taken. At a minimum, the following will be identified in the logbook for each photograph:

- Site name
- Location
- Name of photographer
- Date and time of photograph

- Description of situation/scene photographed.

Sampling Rationale

This section describes the tentative sampling program for this SSI. This program will be modified if necessary depending on the results of the site reconnaissance and offsite access of sampling locations. The samples to be collected and sample rationale are listed in Table 15. Proposed sample analyses and container and preservation requirements for the soil and groundwater samples are shown in Tables 16 and 17, respectively. Sampling locations will be confirmed or determined during the site reconnaissance. Seven groundwater samples are proposed from four domestic supply wells screened at three difference depths (GW-1 through GW-4) nearest to the site and from three existing monitoring wells (GW-5, GW-6, and GW-7) to provide information regarding the potential release of contaminants from the site via the groundwater pathway. A duplicate groundwater sample (GW-8) will also be collected. Fourteen soil and sediment samples will be collected. Sampling will include a background or upgradient and duplicate sample for each matrix (groundwater and soil-sediment). The water well sample locations are presented on Figure 6. Figure 7 presents the approximate soil and sediment sample locations.

The primary contaminants of concern at the site are benzene, toluene, ethylbenzene, 2-nitropropane, chlorobenzene, cyclohexane, xylene, aniline, napthalene, 1,4-dichlorobenzene, 1,1'-diphenylhydrazine, N-nitrosodiphenyl amine, 2-methyl phenol, 2,4-dimethyl phenol, 2,3 dimethyl phenol, diethyl phthalate, and styrene. To address the contaminants of concern, the laboratory will perform EPA-stipulated Contract Laboratory Program (CLP) analytical methods on all samples collected. A formal list of these analytical methods are specified under the CLP routine analytical services (RAS) contract.

Groundwater Pathway

Nonsampling data to be collected includes:

- The location of existing wells, especially within a 1-mile radius of the site, and the population served by these wells will be determined by a well survey. Water level measurements, well construction details, well development procedures, water quality test results, and aquifer pumping data, if available, will also be obtained during this water well survey.
- Water level measurements will be obtained from those monitoring wells screened within the uppermost saturated interval (approximately 8 to 15 feet below surface) and will be used to construct groundwater elevation maps to determine the shallow groundwater flow direction. In addition, survey data will be obtained either from consultants or by performing a survey on the site monitoring wells. The survey on site will likely determine only the relative elevations of the monitoring wells, and not their exact elevation with respect to mean sea level. This will still allow for the determination of the groundwater gradient.

Table 15 Proposed Samples to be Collected at Mobile Waste Controls Houston
Harris County, Texas TXD 988051652

Sample Matrix	Sample ID	Sample Locations	Rationale
Soil	SO-1	Stressed soil area near potential cap cracks on northeast portion of cap.	Assess soil contamination for source characterization from near landfill cap cracks as reported by the TWC.
	SO-2	Stressed soil area near potential cap cracks on southern portion of cap.	Assess soil contamination for source characterization from near landfill cap cracks as reported by the TWC.
	SO-3	Background soil location upgradient from off-site drainage.	Establish background conditions of soil and sediment.
	SO-4	Stressed soil near MW-2.	Assess soil contamination and extent for source characterization from near landfill cap cracks as reported during PA.
	SO-5	Stressed soil near MW-2	Assess soil contamination and extent for source characterization from near landfill cap cracks as reported during PA.
	SO-6	Stressed soil near MW-2.	Duplicate soil sample collected at same location as SO-4 soil sample.
Groundwater	GW-1	9913 East Haven, well 65-31-1B	Assess groundwater in newest domestic well screened at 88-94 feet.
	GW-2	9421 Lambright Road, well 65-31-1C	Assess groundwater in domestic well screened at approximately 88-94 feet.
	GW-3	9205 Wayfarer well 65-30-3	Assess groundwater in domestic well located approximately ½ mile from the pit and screened at 444-454 feet below surface.
	GW-4	9905 Radio Road well 65-31-4C	Assess groundwater in domestic well located approximately ½ mile from the site and screened at 325-345 feet below surface.
	GW-5	Monitor well 2 on southwest corner of pit	Assess uppermost saturated interval at perimeter of pit on presumed downgradient side to determine if contaminants are potentially migrating off site.
	GW-6	Monitor well 8 on southeast corner of pit	Assess uppermost saturated interval on southeast corner of pit to determine potential for offsite migration of contaminants to the south.

Table 15, continued

Sample Matrix	Sample ID	Sample Locations	Rationale
	GW-7	Monitor well 7 on northeast corner of pit	Establish upgradient conditions in uppermost saturated interval.
	GW-8	9913 East Haven well 65-31-1B	Duplicate groundwater sample for QA/QC.
Sediment	SE-1	Probable point of entry into Windmill Lake	Assess whether contaminants have been released to surface water at Windmill Lake.
	SE-2	Upgradient location of PPE into Windmill Lake	Assess conditions of drainage path upgradient of PPE into Windmill Lake.
	SE-3	Probable point of entry into Lake Westwind	Assess whether contaminants have been released to surface water at lake westwind.
	SE-4	Upgradient location of PPE into Lake Westwind	Assess conditions of drainage path upgradient of PPE into Lake Westwind.
	SE-5	Probable point of entry into Lake Westwind	Duplicate sediment sample for QA/QC. Collected at same location as SE-3.
	SE-6	Probable point of entry into Bass Lake	Assess whether contaminants have been released to surface water into Bass Lake.
	SE-7	Upgradient location of PPE into Bass Lake	Assess conditions of drainage path upgradient of PPE into Bass Lake.
	SE-8	Probable point of entry in 4th lake located east of Windmill Lake.	Assess whether contaminants have been released to surface water into 4th lake.
	SE-9	Upgradient of PPE in 4th lake	Assess conditions of drainage path upgradient of PPE into Bass Lake.

Table 16. Sample Containers, Methods, Preservatives, and Holding Times for Soil/Sediment Samples

Parameters	Sample Container	Preservative	Holding Time
Volatile organics	Two 120-mL glass vials with Teflon-lined septa	Cool to 4°C	14 days
Semivolatile organics	8-ounce widemouth glass jar with Teflon-lined lid	Cool to 4°C	Extract within 14 days of collection, and analyze within 40 days of extraction.
Pesticides/PCBs	8-ounce widemouth glass jar with Teflon-lined cap	Cool to 4°C	Extract within 14 days of collection and analyze within 40 days of extraction.
Metals	8-ounce widemouth glass jar	Cool to 4°C	180 days after collection
Cyanide	8-ounce widemouth glass jar	Cool to 4°C	14 days

* Reference: EPA Contract Laboratory Program Statement of Work for Organics Analysis (March 1990) and Statement of Work for Inorganic Analysis (March 1990).

Table 17. Sample Containers, Methods, Preservatives, and Holding Times for Aqueous Samples

Parameters	Sample Container	Preservative	Holding Time
Volatile organics	Two 40-mL glass vials with Teflon-lined septa	Cool to 4°C	7 days
Semivolatile organics	Two 1-liter amber glass bottles with Teflon-lined caps	Cool to 4°C	Extract within 7 days of collection, and analyze within 40 days of extraction.
Pesticides/PCBs	Two 1-liter glass bottles with Teflon-lined cap	Cool to 4°C	Extract within 7 days of collection and analyze within 40 days of extraction.
Metals	One 1-liter plastic bottle	HNO_3 to pH<2	6 months (except mercury*)
Cyanide	One 500-mL plastic bottle	NaOH to pH>12 Cool to 4°C	14 days

* Reference: EPA Contract Laboratory Program Statement of Work for Organics Analysis (March 1990) and Statement of Work for Inorganic Analysis (March 1990).

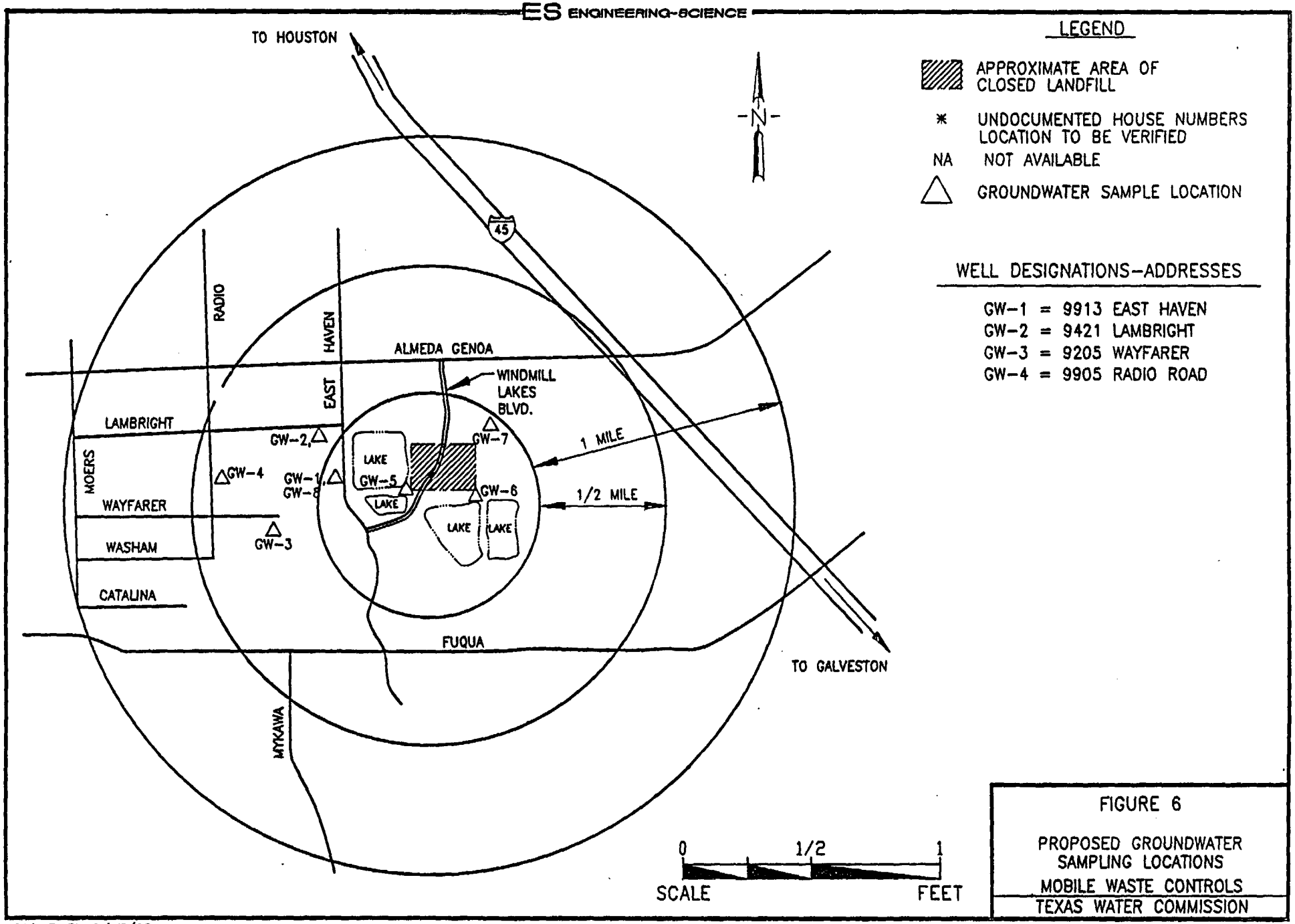


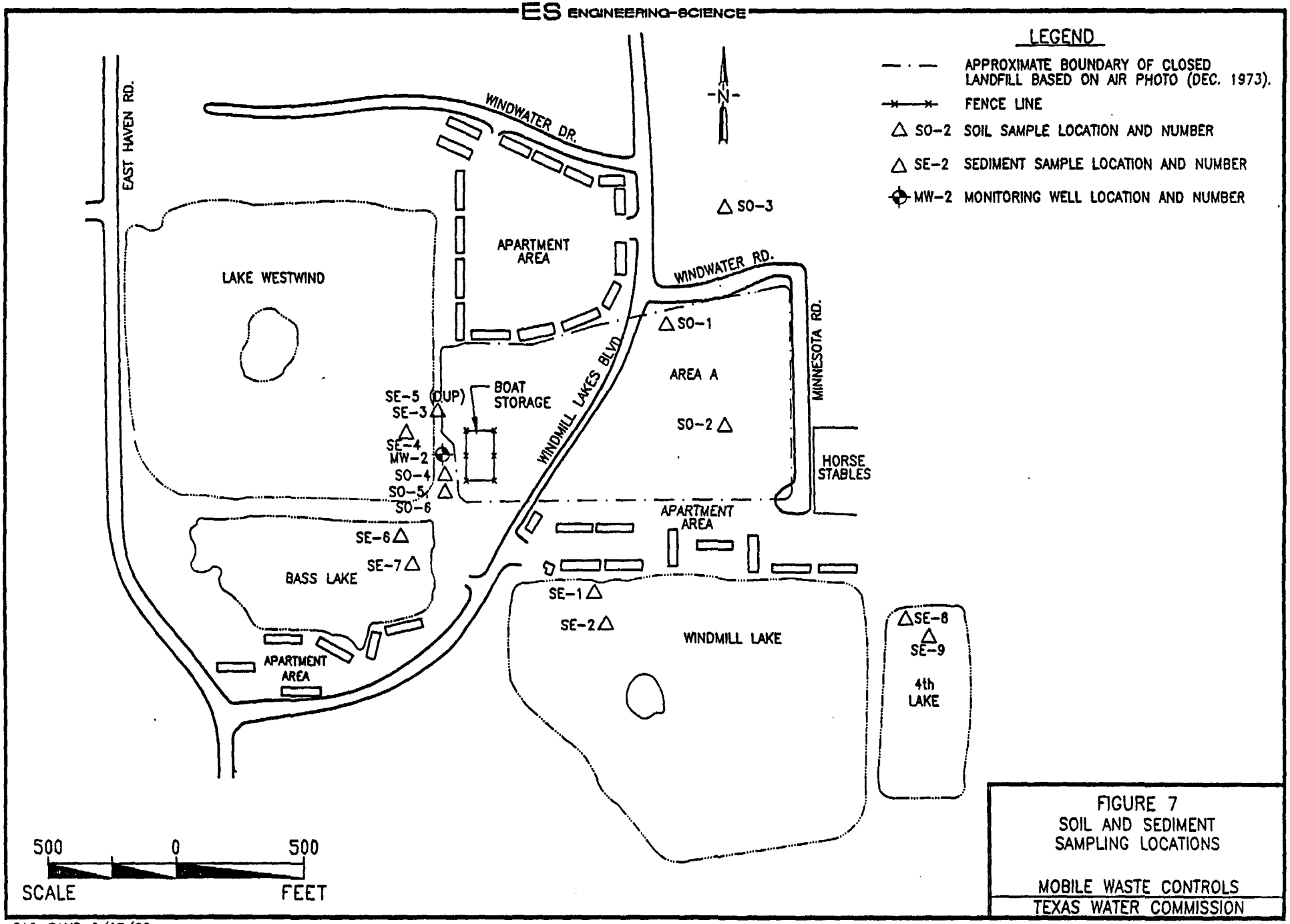
FIGURE 6

PROPOSED GROUNDWATER SAMPLING LOCATIONS

MOBILE WASTE CONTROLS

TEXAS WATER COMMISSION

S10-PWEL 9/17/92



S10-SAMP 9/17/92

- Groundwater samples from four domestic water supply wells within one-half mile of the site will be obtained to characterize the quality of nearby drinking water supplies and determine whether downward and outward migration of contaminants has contaminated drinking water supplies in the vicinity of the site. The four domestic water supply wells to be sampled, located at 9913 East Haven Road (65-31-1B), 9421 Lambright Road (65-31-1C), 9905 Radio Road (65-31-4C), and 9205 Wayfarer (65-30-3), are screened at three different aquifer intervals (88 to 94, 325 to 345, and 444 to 454 feet below surface).

Samples collected from the domestic wells located on East Haven and Lambright roads will be designated as sample number GW-1 and GW-2, respectively (Figure 6). The sample collected from the domestic well located on Wayfarer Road (65-30-3) will be designated as sample number GW-3. A fourth groundwater sample (GW-4) will be collected on Radio Road. The duplicate groundwater sample collected for QA/QC purposes, GW-8, will be collected from the well located on East Haven, which is the nearest domestic well to the site.

If wells are identified closer to the site than those already identified, then the plan will be modified to sample the nearest well from each water producing zone. The well purging and sampling procedures are dependent on the type of well and are discussed in the QAPP.

For domestic wells, if practical, three volumes (well volume and holding tank volume) of water will be evacuated from the well prior to sampling. If the system volume is unknown, a tap will be opened and allowed to run for 15 minutes prior to sampling. Samples will be collected from a point as close to the well as possible and before the water is processed through any treatment devices. Conductivity, temperature, and pH will also be measured during purging activities. Samples will not be collected from a faucet equipped with an aerator.

Three groundwater monitoring wells installed to monitor site conditions will also be sampled in order to establish the quality of the shallow saturated interval in the vicinity of the landfill. Monitoring well 7 (GW-7), if identified in the field, will be sampled. Groundwater samples will also be collected from monitoring well 2 (GW-5) and monitoring well 8 (GW-6). MW-2 will be sampled, because the groundwater sampling program undertaken by the TWC, the city of Houston, and the FDIC identified contaminants of concern present in the groundwater collected from this well. MW-8 will be sampled because of its proximity to Windmill Lake and the fourth unnamed lake. MW-7 will be sampled to serve as probable upgradient well.

Specific requirements for the determination of the presence of immiscible organic contaminants and the volume of water to be removed during well purging will be identified at the time of well sampling.

Surface Water Pathway

Nonsampling data to be collected includes:

- Fish production from nearby lakes will be confirmed through on-site interviews and interviews with TPWD.
- The occurrence of endangered and terrestrial species within a 4-mile radius of the site will be verified through consultation with the Texas Parks and Wildlife Department and through visual observation during the site reconnaissance.
- Recreational uses of surface water will be determined through observation and interviews.
- The location of ditches and surface water bodies, and on-site and off-site drainage patterns, will be verified during the site reconnaissance survey. The drainage ditches providing surface water drainage pathways in the vicinity of the site will be investigated and determined to be intermittent or perennial.
- A document and records review will be completed to determine the flow rate for the Clear Creek segment and the total basin drainage area for the Clear Creek Above Tidal segment.

Water from the four lakes on site have been sampled and analyzed. No additional surface water samples are planned as part of this inspection.

Sediment samples will be collected to investigate the potential for releases to the surface waters of the four lakes surrounding the site. The contaminant pathways to be investigated are the seepage of shallow, potentially contaminated groundwater or landfill leachate through the subsurface to the lakes and the runoff of surface water over potentially contaminated surface soils into the lakes. The four pits that are now filled with water are considered to be small lakes that may be fed by water from springs or seeps that may be impacted by the contaminants buried in the closed landfill excavation.

One sediment sample will be taken upgradient of the probable point of entry of shallow springs or seeps into each lake, and one sediment sample will be taken downgradient of the probable point of entry of the spring or seep into each lake. A maximum of eight sediment samples will be obtained in order to investigate the potential sediment pathway described along the intersection of the shallow, water-bearing interval with the excavation wall of each lake. A duplicate sediment sample (SE-5) will also be collected at PPE of Lake Westwind. Approximate sediment sample locations are shown on Figure 7.

Soil Exposure Pathway

Nonsampling data to be collected includes:

- Drainage patterns and soil exposure pathways surrounding the landfill site will be obtained during the site reconnaissance survey.
- Distance to nearest school will be verified during the site survey.

Up to five soil samples, including one background sample (SO-3) and one duplicate soil sample (SO-6), will be collected in areas of stressed soil or observed landfill cap cracks. Approximate soil sample locations are shown on Figure 7. SO-1 and SO-2

will be collected in areas near reported landfill cracks. Samples SO-4 and SO-5 will be collected in the vicinity of MW-2, where vegetation was reportedly stressed. The exact locations will be determined in the field based on field observations described below. Sample SO-3 will serve as background for both soil and sediment sampling and will be collected in a location upgradient to the pathway associated with Lake Westwind. The sampling locations will be adjusted so that observed areas of contamination, as identified by stressed soil, visible soil staining, or visible leachate collection at the surface, are sampled.

Soil samples will be collected within 6 inches of the upper soil surface. Sampling will be performed with a dedicated trowel or small shovel. The samples will be collected from a depth as close to the surface as possible, yet deep enough to avoid grass and roots. Samples will be placed in glass jars as specified by the CLP and the QA plan and sealed with Teflon-lined lids. Organic samples will be placed in one 8-ounce, wide mouth glass jar and two 120-ml, wide mouth glass vials. Inorganic soil samples will be placed in one 8-ounce, wide mouth glass jar or two 4-ounce, wide mouth glass jars. No headspace will be left in the VOA sample jars. Sample jars will be marked for identification and placed on ice for preservation. Identification markings will include site location, sample number, date and time of collection, and names of samplers.

To avoid cross contamination of samples, dedicated sampling equipment will be used. Decontamination procedures are described in the approved QAPP. Proper sample containers, preservation, and holding times for CLP soil samples are presented in Table 16.

Air Pathway

Nonsampling data to be collected include:

- The location of the nearest resident to the site by on-site reconnaissance or off-site survey.
- Verification of no reports of adverse health effects due to releases of hazardous substances in the air at the site by site interviews and a review of Public Health Department records.

No air samples are planned to assess releases to the air pathway; however, results of surface samples collected for soil exposure and surface water pathway will be used to assess potential for releases to occur to air pathway.

Quality Assurance/Quality Control Samples

Two types of QA/QC samples will be used in this sampling inspection. Duplicate samples will be taken at a rate of one duplicate per matrix (groundwater, if applicable, and soil-sediment). In addition, trip blanks will be collected.

Trip blanks are used to determine if samples are affected by airborne volatiles that pass through the Teflon-lined septum of the sample container. Trip blanks will be prepared in the laboratory by filling two or three 40-milliliter volatile sample vials with organic-free water. The trip blanks will accompany the empty bottles

shipped to the field and will be kept with the samples during collection and shipment to the laboratory. They will be analyzed for the volatile organics only.

Task 2: Decontamination Procedures

Equipment Decontamination

Proper decontamination procedures will aid in preserving the representativeness of the samples collected. Dedicated sampling spoons or trowels will be used to collect each soil or sediment sample at the site. These spoons will be decontaminated prior to arrival at the site and sealed in plastic sealable bags in accordance with the quality assurance project plan. After sampling, gross contamination (visible) will be removed from the sampling equipment and the equipment will be decontaminated by detergent wash and distilled water rinse. The equipment will receive a more thorough decontamination at a location away from the investigated site in accordance with the QAPP. The outside of the sample containers will be rinsed and wiped clean prior to packing in coolers for shipment.

Personal Decontamination

Decontamination fluids used to clean equipment will be disposed of onsite in the approximate area of the sampling location in accordance with investigation derived waste (IDW) guidelines. Equipment decontamination will not be necessary in the case of any domestic wells sampled, since water is collected directly from a tap. All disposable clothing (Tyvek, gloves, etc.) will be shredded prior to disposal to prevent reuse. Boots will be scrubbed with soap and brush and rinsed with potable or distilled water in a tub. Decontamination fluids from the rinse will also be disposed of on site. The location of IDW disposal will be described in the field log book.

Task 3: Sample Shipping

During sampling activities, the samples will be packed and preserved according to procedures described in the QAPP. The outside of sample containers will be washed on site and wiped clean prior to packing into the cooler for shipment. The project team will complete the paperwork necessary to ship samples to CLP laboratories for analytical testing. The field team will request RAS 14-day turnaround from the CLP laboratory. The sample handling and custody requirements are discussed in greater detail in the QAPP.

Samples will be shipped and delivered to the designated laboratory for analysis daily. The overnight freight courier pickup and office schedule in the area of the site is:

Federal Express
8200 Telephone Road
Houston, Texas
Last drop off at 8:15 p.m. Monday through Friday; 5:00 p.m. Saturday

During sampling and sample shipment, the ES field team leader (or his designee) will contact the CLP sample management office (703) 557-2490 or (703) 684-5678 to inform them of shipment.

The samples will be shipped in ice chests by overnight courier such as Federal Express. The chain-of-custody forms will be placed within the chest in this case, and the shipper will receive a chest which is sealed with tamper-resistant tape. The tamper-resistant seal is paper or plastic tape which cannot be removed without tearing it. The seals will be signed by the sample custodian shipping the samples.

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15. Database for Houston, Texas, National Weather Service.
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17. U.S. Geological Survey Map, Friendswood Quadrangle, 1982.
18. National Park Service, Santa Fe, New Mexico, *National Parks in Texas* brochure.